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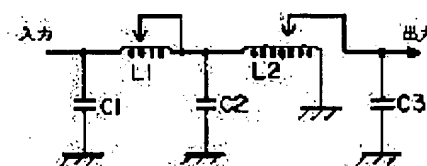
(72)Inventor : KAWAMURA SHIGERU  
YAMASHITA NOBUYUKI

## (54) ANTENNA TUNING AND MATCHING CIRCUIT FOR SOLIDIFIED SHORT-WAVE TRANSMITTER

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To attenuate the low-frequency part of a lightning surge by simple connection changes of the circuit and to maintain a function for matching antenna impedance by grounding the other end of the free turn of a variable coil ahead of a roll contact and forming a single turning circuit, with has a turning frequency by using the inductance and capacitor at the free-turn part.

**SOLUTION:** The terminal of the load-side free turn of a variable coil L2 is grounded, and the single turning circuit is formed of the inductance and capacitor C3 at the free-turn part of the variable coil L2 to attenuate the frequency component of the low band. The tuning frequency of the single turning circuits is set lower than a transmission frequency, and then a double- $\pi$  circuit is equivalently obtained in the case of the transmission frequency. Here, since the capacitance of the capacitor C3 at this time needs to cancel the inductance of the free-turn part of the variable coil L2 in the case of the transmission frequency, it is adjusted to be larger than that before the free turn of the variable coil L2 is grounded.



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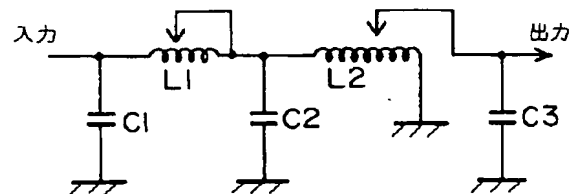
(71)出願人 000001122  
国際電気株式会社  
東京都中野区東中野三丁目14番20号  
(72)発明者 川村 繁  
東京都中野区東中野三丁目14番20号 国際  
電気株式会社内  
(72)発明者 山下 信之  
東京都中野区東中野三丁目14番20号 国際  
電気株式会社内  
(74)代理人 弁理士 大塚 学

(54)【発明の名称】 固体化短波送信機のアンテナ同調整合回路

(57)【要約】

【課題】固体化短波送信機のアンテナ同調整合回路のインピーダンス整合と高調波除去機能の他に、アンテナからの雷サージを減衰させる機能を持たせる。

【解決手段】ダブル $\pi$ 形回路の直列アームの少なくとも1つの可変コイルL2の中間可動接点から先のフリーターンの端末を出力端子から外して接地しコイルL3とする。コイルL3と出力側コンデンサC3とで単同調回路を形成し、そのBPF特性により低い周波数帯域の雷サージを減衰させる。



## 【特許請求の範囲】

【請求項1】 固体化短波送信機の送信増幅器とアンテナとのインピーダンス整合及び送信出力の高調波成分の除去を行うダブルバイ形同調整回路であって、該ダブルバイ形回路のそれぞれは、高周波信号の入力端子と接地間に接続された第1のコンデンサと、該入力端子に一端が接続されたコイルの該一端から中間可動接点部分のコロ接点に至るまでのインダクタンス値を有し該コロ接点が接続された回転軸が出力端子となり該コロ接点から先のコイルのフリーターンの他端が前記出力端子に短絡された可変コイルと、該出力端子と接地間に接続された第2のコンデンサとから構成され、全体として低域通過フィルタ特性を有するアンテナ同調整回路において、前記可変コイルの少なくとも1つは、前記コロ接点から先のコイルのフリーターンの他端が接地されて、該フリーターン部分のインダクタンスと前記第2のコンデンサとで発射周波数より低い同調周波数を有する単同調回路が形成され、全体として送信周波数信号を通過させアンテナからの雷サージ電圧を減衰させる帯域通過フィルタ特性を有するように構成されたことを特徴とする固体化短波送信機のアンテナ同調整回路。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、送信機のアンテナ同調整回路に関し、特に、固体化（半導体化）された短波送信機のアンテナ同調整回路に関するものである。

## 【0002】

【従来の技術】一般的に、アンテナから入ってくる雷サージ防止回路は、雷サージが8～10kHz付近に最大エネルギーがあると言われているため、その周波数成分が電力増幅部の固体化素子に印加されることを低減できれば如何なる回路でもよいことになる。従って、HPF（高域フィルタ）を挿入すれば3～30MHzの電力増幅部に印加される雷サージが低減できる。但し、HPFを負荷側（アンテナ側）に挿入すると、アンテナインピーダンスによってHPFのインピーダンスが変化し、減衰特性も周波数によって変化することになる。

【0003】短波送信機のアンテナ同調整回路は、電力増幅部とアンテナとのインピーダンス整合、及び電力増幅部の出力に含まれている高調波を除去するという2つの役割がある。短波帯では高調波の低減に主眼を置くため、回路には低域フィルタ（LPF）形の同調整回路を使うのが一般的であり、低周波の雷サージに対してはスルーで電力増幅部にサージが印加される。そこで、同調整回路に使っている部品については耐圧を上げればよいが、電力増幅部に使っている半導体素子は、普及している素子で耐圧に限界があり全て耐圧は低いものである。従って、短波帯の固体化送信機においては、必要

十分な雷サージからの保護対策がなされていないことになる。

【0004】送信出力が中電力以上（数kW）の真空管式短波送信機の場合は、電力増幅部に真空管を使っているため使用電圧が高く（数kV）雷サージに対しては比較的電圧的な強さを持っている。従って、アンテナからの雷サージ対策には送信機出力部分にドレンコイルを挿入する程度で問題はなかった。

【0005】一方、小電力の固体化短波送信機は、電力増幅部に使っている半導体の制約から使用電圧も低く（数10V）、かつ半導体も高耐圧のものは普及していない。従って、上記従来の真空管式の場合と同じサージ対策方法では不十分である。

【0006】図5は本発明を適用しようとする固体化短波送信機の系統図であり、SSB、DSB波の直線増幅送信機の一般的な構成例である。変調器は、音声信号をSSB波、DSB波に変換するものであり、次の周波数変換器において発射周波数に変換する。励振増幅器は電力増幅器に必要なレベルまで増幅する前置増幅器であり、分配器は各電力増幅器へ信号を分配する。各電力増幅器において必要なレベルまで増幅し、合成器において各電力増幅器からの電力を合成する。次の同調整回路はアンテナとの整合をとり合成出力の高調波を除去してアンテナに供給する。雷サージ吸収回路はアンテナからの雷サージを吸収する電圧クリッパーである。

【0007】図5に示すように、最近の固体化短波送信機には雷サージ吸収回路などを付加するのが一般的である。この回路には半導体による直流重畳方式の電圧クリッパー回路が多い。しかし、この回路方式では半導体を使用しているため雷サージの大きさによっては焼損する可能性があり、雷サージ対策としてまだ不十分である。

## 【0008】

【発明が解決しようとする課題】図6は従来の同調整回路の回路例図であり、一般的に用いられているダブルバイ型同調整回路の回路例図である。C1、C2、C3は固定コンデンサ、L1及びL2は可変コイルであり、コイルの負荷側（フリーターン側）を短絡している。なお、コンデンサC1、C2、C3の値は周波数帯域によって切替スイッチにより固定定数を切替えるのが通常である。図7は図6に示した従来のダブルバイ型同調整回路の伝送特性例であり、低域通過特性（低域フィルタと同等）を示し、アンテナからの低域雷サージに対しては何等減衰を与えない特性である。

【0009】図3はコイルの構造概念図である。（A）は従来の接続方法であり、図6のコイルL1、L2の構造を示す。ホット側から高周波を入力し、コイルを通過してコロ接点に行き、このコロ接点は回転軸（コロ軸）に接続されているため出力ラインとなる。コイルのインダクタンスとして使っていない部分（フリーターン）は、出力軸とコイル端で短絡されている。

【0010】固体化送信機のアンテナからの雷サージは、そのサージ電圧が誘導雷または直撃雷の程度によりサージ電圧が不明確であるため、送信機においてはできる限り低減する必要がある。そこで、同調整合部分にHPFを組み込めば、そのHPFの減衰特性分だけ電力増幅部に印加される雷サージを低減することができる。しかし、これまで短波送信機には、HPFを組み込んだものがなく、しかも、同調整合部分にHPFを組み込む場合、従来の回路に、HPFを構成するコイル及びコンデンサを新たに追加する必要があり、極めてコスト増になるという問題が生じる。

【0011】本発明の目的は、新たな部品を付加することなく従来の回路の簡単な接続変更と一部定数変更で雷サージの低域部分を減衰させ、かつ従来のアンテナインピーダンスとの整合機能も維持でき、経済的で、かつ効果的なアンテナ同調整合回路を提供することにある。

【0012】

【課題を解決するための手段】本発明のアンテナ同調整合回路は、固体化短波送信機の送信増幅器とアンテナとのインピーダンス整合及び送信出力の高調波成分の除去を行うダブルバイ形同調整合回路であって、該ダブルバイ形回路のそれぞれは、高周波信号の入力端子と接地間に接続された第1のコンデンサと、該入力端子に一端が接続されたコイルの該一端から中間可動接点部分のコロ接点に至るまでのインダクタンス値を有し該コロ接点が接続された回転軸が出力端子となり該コロ接点から先のコイルのフリーターンの他端が前記出力端子に短絡された可変コイルと、該出力端子と接地間に接続された第2のコンデンサとから構成され、全体として低域通過フィルタ特性を有するアンテナ同調整合回路において、前記可変コイルの少なくとも1つは、前記コロ接点から先のコイルのフリーターンの他端が接地されて、該フリーターン部分のインダクタンスと前記第2のコンデンサとで発射周波数より低い同調周波数を有する単同調回路が形成され、全体として送信周波数信号を通過させアンテナからの雷サージ電圧を減衰させる帯域通過フィルタ特性を有するように構成されたことを特徴とするものである。

【0013】

【発明の実施の形態】本発明は、固体化短波送信機において、アンテナ同調整合回路に狭帯域フィルタ(BPF)特性をもたせてアンテナからの雷サージを減衰させるようにしたことを特徴とし、さらに、次の特徴を有するものである。

a. 従来の同調整合回路の方式変更及び部品追加を行わないで、従来の低域フィルタ(LPF)特性に高域フィルタ特性を追加できる方法である。

b. コイルのフリーターンを接地して各ステージのコンデンサと単同調回路を形成させるだけでよい。

c. コイルのフリーターン接地は同調整合回路に使用して

いる複数のコイルのうちの1個、または数個実施してもよく、多くなれば低域の減衰量を多くすることができる。

d. 他の種々の同調整合回路の場合は、その回路に使用しているコンデンサと単同調回路を形成することができれば、いかなる回路でも実施できる。

e. 発射周波数が低い場合で、可変コイルのフリーターンインダクタンスが小さい場合は、固定のコイルを追加してもよい。

【0014】

【実施例】図1は本発明の実施例を示す回路図であり、狭帯域同調整合回路である。可変コイルL2の負荷側フリーターンの端を接地して、コイルの使っていない部分のインダクタンスとC3とでBPFを形成している。

【0015】図2は、図1の等価回路でL3(図1のL2のフリーターン部分)とC3で単同調回路を形成し低域の周波数成分を減衰させている。この単同調回路の同調周波数を発射周波数より低くすれば、発射周波数では等価的にダブルバイ回路と同等になる。但し、この時C3の容量は、図2におけるL3のインダクタンスを発射周波数において打ち消す必要があるため、L2のフリーターン接地前より多くなるように調整する。

【0016】図3(B)は本発明のコイルの概念図を示す構成例である。(A)に示した従来例では、真空管式送信機において、コイルのフリーターン側(インダクタンスとして使わないコイル部分)の端をRF出力軸と短絡して、固有共振と高調波による異常電圧発生によって発生するスパーク事故を防止していた。しかし、固体化送信機では直線増幅(A級動作)が主であり高調波の発生が、従来のC級動作の真空管式送信機より少ない。従って、コイルのフリーターン側端の処置は、開放でも短絡でも、送信機の安定度にはほとんど影響がなくなった。従って、本発明のようにフリーターン側を接地しても問題はなく、コイル全体で余った部分を単同調回路の素子として利用するので極めて効果的である。

【0017】図4は本発明のアンテナ同調整合回路の伝送特性例図であり、低域及び高域部分が減衰するBPF特性である。なお、上記の実施例では、一方の可変コイルL2のみフリーターンを接地するようにしたが、もう一方の可変コイルL1も接地してもよい。また、可変コイルの負荷側のみでなく電源側(ホット側)を接地してもよい。但し、この時の単同調回路はC1とL1及びC2とL2との組合せになる。

【0018】本発明の方法を実施すれば、低域部分の雷サージ成分の減衰を部品追加なしで実施することができ、かつ接地側に使うコイルの高周波電流容量、高周波耐圧電圧も安全性が維持されている。

【0019】また、発射周波数が低く可変コイルのフリーターンインダクタンスが少ない場合は、固定のコイルを追加してもよい。

【0020】

【発明の効果】以上説明したように、本発明を実施することにより、送信機と同調整回路にBPF特性を付加することで、アンテナからの雷サージを十分に減衰させることができ、電力増幅部の半導体素子を保護することができる。そのBPF特性も従来の回路構成を変更せずに、配線変更及び定数変更のみで対処することができるため、極めて経済的であり、実用上の効果が大きい。

【図面の簡単な説明】

\*【図1】本発明の実施例を示す回路構成例図である。

【図2】図1の構成の等価回路図である。

【図3】コイルの構造概念図であり、(A)は従来例、(B)は本発明の実施例である。

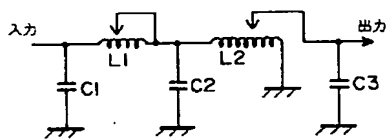
【図4】本発明回路の伝送特性例図である。

【図5】本発明を適用しようとする短波送信機の系統図である。

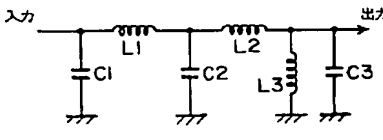
【図6】従来の同調整回路例図である。

\*【図7】従来の同調整回路の伝送特性例図である。

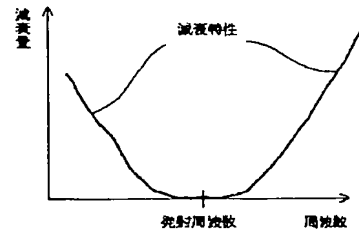
【図1】



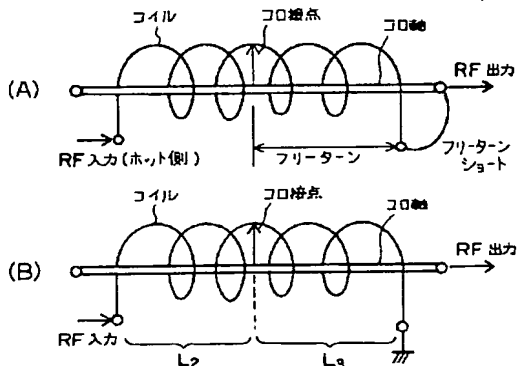
【図2】



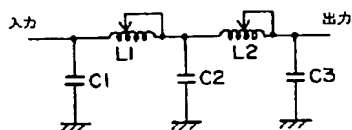
【図4】



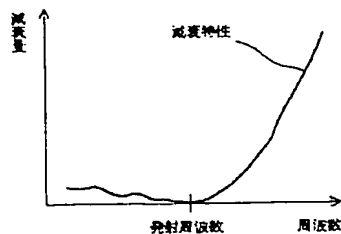
【図3】



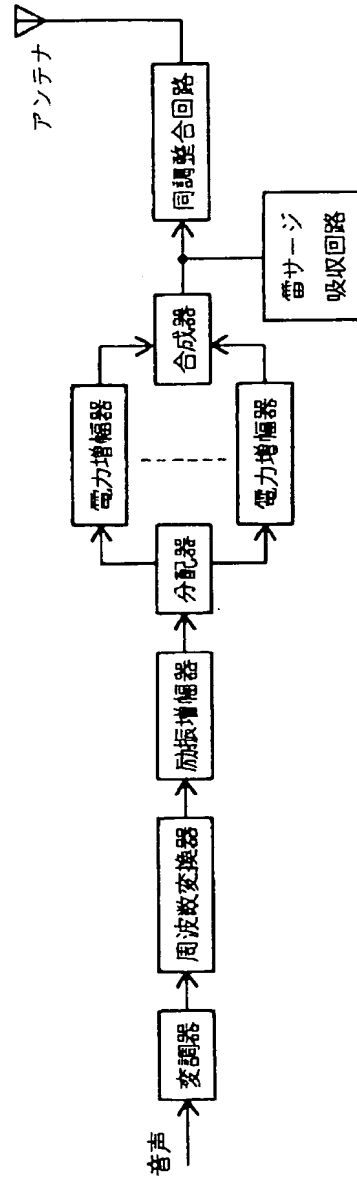
【図6】



【図7】



【図5】



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**CLAIMS**

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[Claim(s)]

[Claim 1] The arsenic content ashes processing agent characterized by including a bivalence iron compound, an electron-donative organic compound, and water.

[Claim 2] The arsenic content ashes processing agent to which an arsenic content ashes processing agent is characterized by liquefied or being a slurry-like in an arsenic content ashes processing agent according to claim 1.

[Claim 3] The arsenic content ashes processing agent characterized by the coordination atoms in an electron-donative organic compound being an oxygen atom and/or a nitrogen atom in an arsenic content ashes processing agent according to claim 1 or 2.

[Claim 3] The arsenic content ashes processing agent to which a bivalence iron compound is characterized by being ferrous chloride and/or a ferrous sulfate in an arsenic content ashes processing agent according to claim 1 to 3.

[Claim 5] The art of the arsenic content ashes characterized by adding and kneading an arsenic content fly ash processing agent and pH regulator in arsenic content ashes in an arsenic content fly ash processing agent according to claim 1 to 4.

[Claim 6] The art of the arsenic content ashes characterized by pH regulator being a calcium hydroxide in the art of arsenic content ashes according to claim 5.



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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is faced processing the ashes generated or discharged from the incineration plant which performs city dust, incineration of various industrial waste and sewage nightsoil treatment sludge, etc., or the combustion plant of coal and a fuel oil, and relates to the processing agent for fixing the arsenic contained in ashes simple and forming it into insoluble appearance, and the art using it.

[0002]

[Description of the Prior Art] The increment of the so-called discharge of current, the combustion residue discharged from various combustion facilities, and ashes is being enhanced, and rationalization of the art is called for. For example, the incinerated ash (blast furnace bottom ashes) and fly ash which are generated or discharged from incineration plants, such as city dust and industrial waste, can be mentioned as the representative, and the approach of prehension of the eluted heavy metal or a nonmetal kind and immobilization, the approach of a deployment of the ashes itself, etc. are proposed variously.

[0003] After uptake of the fly ash especially discharged from incineration plants, such as city dust and industrial waste, is carried out with an electrostatic precipitator (henceforth "EP"), or a bag filter (henceforth "BF"), reclamation and ocean dumping are carried out.

[0004] However, these ashes contain many harmful heavy metal, and elution, such as lead by the storm sewage from a reclaimed ground etc. and mercury, has the possibility of environmental pollution. Furthermore, about arsenide, it is used for a wood preservative, a glass clarifier, a semi-conductor raw material, etc., and may mix into city dust, and there is a case where content of arsenic is accepted in the ashes actually generated when city dust is incinerated plentifully. Furthermore, arsenic may contain in the ashes coconut urine processing sludge incinerated ash discharged from a combustion facility of coal, a fuel oil, etc. On the other hand, the arsenic elution from fly ash generally there is much what has high toxicity, and according to storm sewage should be controlled as much as possible so that arsenide may be represented by arsenous acid.

[0005] It is obliged to discard, after specifying ashes as a waste subject to special control and processing either a "cement solidification method", "the extraction method by the solvent of an acid and others", the "melting fixing method" or a "drugs addition method" to such a problem.

[0006] Among these, compared with other approaches, since equipment and its handling are simple, the drugs addition method is examined variously. For example, the approach using the dithiocarbamate which uses as a raw material two sorts of polyamine from which molecular weight differs is indicated by the JP,3-231921,A official report, the approach of using together with inorganic sulfide etc. further is indicated and made into JP,5-50055,A etc., and the approach of using the dithiocarbamate which uses diethylenetriamine as a raw material for JP,6-79254,A is proposed. Furthermore, approaches using an inorganic agent, such as the approach of processing with iron salt and alkali, such as calcium (OH)<sub>2</sub> (calcium hydroxide), and a method of using phosphate for JP,4-61710,B or JP,7-155725,A, are indicated at the approach of processing with

a sodium hydro sulfide to JP,5-77477,B, and JP,63-53875,B.

[0007] However, these approaches make it the key objective to fix and form heavy metal, such as lead, cadmium, zinc, chromium, mercury, copper, and nickel, into insoluble appearance, and are inadequate about immobilization of the arsenic which is a nonmetal kind, and the formation of insoluble appearance. According to this invention person's knowledge, by the case where the dithiocarbamate supposed that trivalent arsenic is caught is used independently, immobilization of arsenic and insoluble appearance-ization did not fully accomplish, but it actually had a fault, like the addition increases. Especially, an arsenic content is high like the incineration fly ash of nightsoil treatment sludge, or the fly ash from the combustion plant of coal and a fuel oil, and it becomes inadequate immobilization of arsenic and insoluble-appearance-izing arsenic in the ashes which exist in the state of arsenate or arsenite in many cases. On the other hand, generally there is no capacity which catches arsenic in inorganic agents, such as a sulfide and phosphate. Moreover, although the salt of aluminum and calcium forms arsenic acid, arsenous acid, and the salt of water poor solubility, arsenic prehension ability of the former is low and the latter does not have the arsenic prehension ability by the side of acidity. Furthermore, since iron salt also formed arsenic acid and arsenous acid, and a water poorly soluble salt, it could expect immobilization of arsenic, but as an example showed, when trivalent iron salt, such as a ferric chloride, was used, it had the technical problem that the addition increased.

[0008] Furthermore, although this invention person is doing the knowledge of arsenic prehension ability having very expensive iron salt of bivalence, and being suitable for immobilization of arsenic The water solution of a ferrous chloride salt or a ferrous-sulfate salt immediately after preparation Although arsenic is fully caught, the oxidation to the trivalent iron of the bivalence iron by air oxidation etc. from after preparation advances, and precipitate generates. It had the technical problem that it was limited to the solid-state whose gestalt for transportation of the technical problem, i.e., the processing agent for arsenic prehension, that

arsenic prehension ability falls, and a mothball is a stable gestalt.

[0009] In an ashy processing technical field furthermore, for mixing with drugs and ashes In order it is common to use kneading machines, such as a 2 shaft paddle type kneading machine, an oscillating granulation type kneading machine, and a compulsive churning pan mold mixer type kneading machine, and to fully distribute drugs on ashes It is desirable that it is a slurry-like and, as for drugs, it is important that a water solution etc. is liquefied or not to cause troubles, such as lock out, in a storage tank and a drugs feeder process for stable operation over a long period of time. Moreover, in such an incineration facility etc., there are many facilities which do not hold the mixing vessel which a solid-state object can dilution dissolve, and carrying in by the shape of liquid is desirable in many cases.

[0010]

[Problem(s) to be Solved by the Invention] In view of the above-mentioned problem etc., the purpose of this invention solves it, namely, simple still more efficiently, the arsenic in ashes is fixed and it is to offer the stable drugs for arsenic content ashes processing insurance, the approach of forming into insoluble appearance, and whose mothball become possible.

[0011]

[Means for Solving the Problem] this invention person etc. adds the drugs which contain a bivalence iron compound, an electron-donative organic compound, and water in arsenic content ashes, as a result of repeating examination wholeheartedly that the above-mentioned technical problem should be solved, fixes the arsenic contained in ashes by carrying out kneading processing, and can carry out [ insoluble appearance ]-izing of it, and, moreover, it came to complete a header and this invention for these drugs maintaining that effectiveness over a long period of time. That is, this invention is the approach of fixing and forming into insoluble appearance the arsenic in the arsenic content ashes using the arsenic content ashes processing agent and it which consist of a bivalence iron compound, an electron-donative organic compound, and water.

[0012] In this invention, especially the target arsenic content ashes are not limited and point out all the combustion residue containing arsenic. For example, it can usually be discharged from incineration facilities, such as city dust and industrial waste, the combustion facility of coal and petroleum, a nightsoil treatment sludge combustion facility, etc., \*\*\*\*, incinerated ash (blast furnace bottom ashes), etc. by which uptake was carried out by EP, BF, the multicyclone, etc. can be pointed out, and it can apply to the arsenic content ashes of all descriptions of acid ashes, neutral ashes, alkaline ashes, etc.

[0013] In order to make it fully distribute as a pharmaceutical form of the arsenic content ashes processing agent of this invention on the ashes by which drugs are processed, it is desirable liquefied or that it is a slurry-like.

[0014] As a bivalence iron compound used in the arsenic content ashes processing agent of this invention, the anhydride or hydrates of organic bivalence iron salt, such as the anhydride of inorganic bivalence iron salt, such as ferrous chloride, ferrous bromide, a ferrous sulfate, and ferrous ammonium sulfate, or a hydrate, fumaric-acid iron, iron lactate, a ferrous oxalate, the first iron of perchloric acid, and sodium ferrous citrate, can be used. Among these, it is cheap, the chloride and sulfate which are easy to come to hand are used preferably, and ferrous chloride and a ferrous sulfate with the high solubility especially to water are used preferably. Furthermore, these bivalence iron compounds can be used as independent or two or more sorts of mixture.

[0015] In addition, in this specification, a "bivalence iron compound" may mean not only an anhydride but a hydrate.

[0016] If it is the organic compound which can be configurated in bivalence \*\*\*\* as an electron-donative organic compound used in the arsenic content ashes processing agent of this invention, especially, it is not limited but can use. Since the compound whose coordination atom is 5B of the periodic table or 6B group atom is desirable especially and the compound especially whose coordination atoms are a nitrogen atom and/or an oxygen atom is easy to receive, it is suitable.

[0017] Specifically Nitrogen-nitrogen coordination compounds, such as

monochrome and polyamine compound, and a pyridine system compound,  
 Monochrome and a polycarboxylic acid compound, the Pori carbonyl compound,  
 an amino carboxylic-acid compound, Oxygen-oxygen coordination compounds,  
 such as an oxime system compound, amino alcohol, and an aminophenol system  
 compound, An alkoxy alkylamine system compound, a hydroxyquinoline system  
 compound, the high molecular compound with which nitrogen-oxygen  
 coordination compounds, such as an amide system compound, etc. can be  
 mentioned, and structure of these compounds is further used as the principal  
 chain and/or the side chain -- and coordination or the metal complex compound  
 which carried out the chelate is also already contained in a metal ion. Specifically  
 furthermore, as monochrome and polyamine compound Ethylamine, n  
 propylamine, i-propylamine, n butylamine, i-butylamine, a sec-butylamine, tert  
 butylamine, an amyl amine, hexylamine, 2-ethylhexylamine, cyclohexylamine, an  
 aniline, benzylamine, Primary amine, such as xylene diamine, 2-naphthylamine,  
 an aminomethyl pyridine, allylamine, phenethylamine, a toluidine, an anisidine,  
 cresidine, a phenetidine, and a xylidine Diethylamine, G n propylamine, G i-  
 propylamine, G n butylamine, a G i-butylamine, a G sec-butylamine, diamylamine,  
 G 2-ethylhexylamine, N-methylaniline, N-phenylaniline, dibenzylamine,  
 Secondary amine, such as a diaryl amine, phenothiazin, and N-ethylaniline  
 Polyethylene polyamine, such as ethylenediamine, diethylenetriamine,  
 triethylenetetramine, tetraethylenepentamine, pentaethylenehexamine, hexa  
 ethylene HEPUTAMIN, hepta-ethylene OKUTAMIN, triethylenediamine, and  
 polyethyleneimine Propylenediamine, butylene diamine, a  
 hexamethylenediamine, dipropylenetriamine, 1, 2-diaminopropane, 1, 3-  
 diaminopropane, 1, 4-diaminopropane, 3-(diethylamino) propylamine, 3-  
 Polyalkylene polyamine, such as propylamine, 3-(methylamino) propylamine, 3-  
 (dimethylamino) propylamine, the N-methyl -3, and 3'-iminobis (propylamine),  
 (Dibutylamino) a piperidine, a pyrrolidine, a piperazine, N-aminoethyl piperazine,  
 N-methyl piperazine, a screw (aminopropyl) piperazine, 2-(1-piperazinyl)  
 pyrimidine, 2-methylpiperazine, 2, 5-dimethyl piperazine, and cis- one -- 2 and 6-

dimethyl piperazine -- Annular amines, such as 2-pipecoline, 3-PIPEKORIN, 1, 3-JI (4-piperidyl) propane, and ethyleneimine, etc. can be mentioned.

[0018] As a pyridine system compound, a pyridine, 4-vinylpyridine, 2, and 2'-bipyridine etc. can be mentioned.

[0019] As monochrome and a polycarboxylic acid compound, acrylic-acid, glycolic-acid, diglycolic acid, ethylene dicarboxylic acid adipic-acid, citric-acid, and citric-acid 1 potassium, calcium citrate, citric-acid 3 ammonium, citric-acid 3 potassium, citric-acid 3 sodium, citric-acid 3 lithium, citric-acid hydrogen 2 ammonium, citric-acid hydrogen disodium, a citric-acid 2 hydrogen potassium, citric-acid 2 ammonium, sodium ferrous citrate, polyacrylic acid, sodium polyacrylate, etc. can be mentioned.

[0020] As a Pori carbonyl compound, an acetylacetone, a polyvinyl METAKU roil acetone, polyvinyl thoria krill methane, etc. can be mentioned.

[0021] As an amino carboxylic-acid compound, glycine, 12-amino-dodecanoic-acid, p-hydroxy phenylglycine, iminodiacetate, ethylenediaminetetraacetic acid, and ethylenediaminetetraacetic acid 2 ammonium, ethylenediaminetetraacetic acid 2 lithium, ethylenediaminetetraacetic acid 2 potassium, disodium ethylenediaminetetraacetate, ethylenediaminetetraacetic acid iron sodium, etc. can be mentioned.

[0022] A dimethylglyoxime, dimethylglyoxime disodium, cyclohexanedione dioxime, etc. can be mentioned as an oxime system compound.

[0023] As amino alcohol and an aminophenol system compound, monoethanolamine, diethanolamine, N,N-diethylethanolamine, N,N-dimethylethanolamine, N-methylethanol amine, N-(2-aminoethyl) ethanolamine, N,N-dibutylethanolamine, mono-propanolamine, monoisopropanolamine, diisopropanolamine, o and m, para aminophenol, Metol, 2, and 4-diaminophenol etc. can be mentioned.

[0024] As an alkoxy alkylamine system compound, 3-methoxypropylamine, 3-ethoxypropylamine, 3-(2-ethylhexyloxy) propylamine, 3-isopropoxy propylamine, 3-butoxy propylamine, 3-iso butoxy propylamine, etc. can be mentioned.

[0025] As a hydroxyquinoline system compound, 4-hydroxyquinoline, 8-hydroxyquinoline, a 8-hydroxy kino RINARU minium salt, 4-hydroxy-2-quinoline carboxylic acid, etc. can be mentioned.

[0026] As an amide system compound, a glycyl-L-alanine, a glycylglycine, N-[3-(dimethylamino) propyl] acrylamide, N-[3-(dimethylamino) propyl] methacrylic friend dollar, etc. can be mentioned.

[0027] These electron-donative organic compounds can be used as independent or two or more sorts of mixture.

[0028] Although especially the quantitative ratio to the bivalence iron compound of the electron-donative organic compound used in the arsenic content ashes processing agent of this invention is not restricted, it makes the fixed ability of arsenic maintain effectively, or in consideration of economical efficiency, the range of 0.001-50 mols per one mol of bivalence iron compounds is desirable, and its range which is 0.01-10 mols is especially desirable.

[0029] Moreover, although the quantitative ratio to the bivalence iron compound of the water used in the arsenic content ashes processing agent of this invention is not restricted especially if it is the range where the pharmaceutical form serves as the shape of a solution or a slurry, its range of the 0.1 - 1000 weight section is desirable to the bivalence iron 1 weight section, and its range of the 0.5 - 500 weight section is especially desirable.

[0030] Although the amount of the arsenic content ashes processing agent used changes in the approach of processing arsenic content ashes using the arsenic content ashes processing agent of this invention, with gestalten of the amount of arsenic, or other heavy metal contained in the ashes to process Usually, the range of 0.05 - 20 weight section and the arsenic content ashes processing agent of the amount which serves as the range of 0.1 - 10 weight section preferably are used for the bivalence iron compound contained in an arsenic content ashes processing agent to the ashes 100 weight section processed. When the immobilization or the formation of insoluble appearance of arsenic which it contains in not fulfilling this range is inadequate or this range is crossed,



it may become disadvantageous economically.

[0031] In the art of the arsenic content ashes of this invention, if there is need, in order to humidify arsenic content ashes in addition to the water contained in an arsenic content ashes processing agent, water (the water hereafter used in order to humidify arsenic content ashes is called "humidification water") may be added further. Here, as an amount of humidification water, it is preferably used in the range of 5 - 50 weight section to the arsenic content ashes 100 weight section to process. When it is used using the amount which may become inadequate [ a kneading condition with drugs ] and exceeds 50 weight sections as the reason when it is used under in 5 weight sections, it is because the ashes processed and obtained may become liquefied and abandonment may become difficult.

[0032] In the art of the arsenic content ashes of this invention, the temperature at the time of kneading arsenic content ashes and an arsenic content ashes processing agent and especially a kneading method are not limited, and the temperature and the kneading method which are used by this technical field can be used for them. For example, as temperature, the range of -50-500 degrees C is desirable, and the range which is 0-300 degrees C is especially desirable. Moreover, as a kneading method, a biaxial paddle method, an oscillating granulation method, a compulsive churning pan mold mixer method, etc. can be used.

[0033] In the art of the arsenic content ashes of this invention, if needed, using pH modifiers, such as a sulfuric-acid band, a sulfuric acid, a hydrochloric acid, a nitric acid, a sodium hydroxide, a potassium hydroxide, and a calcium hydroxide, arsenic content ashes can be adjusted to pH of arbitration, and this invention can also be carried out. Among this, a calcium hydroxide is used preferably.

[0034] Moreover, there is especially no limit in the injection mode to the arsenic content ashes of these arsenic content ashes processing agents, humidification water, and pH regulator. Addition kneading of the pH regulator is carried out beforehand at arsenic content ashes. the approach of carrying out addition kneading of these separately in arsenic content ashes -- After mixing beforehand

the approach and these which mix with an arsenic content ashes processing agent with water after that, and carry out addition kneading of the liquid, Once or the approach of adding small quantity every can take all injection modes, kneading [ it not only adding the approach of carrying out addition kneading, and these at once in arsenic content ashes, but ] the approach and arsenic content ashes which are added on a small quantity [ every ] intermittence target.

[0035]

[Example] Hereafter, although this invention is further explained to a detail using an example, this invention is not limited to these.

[0036] In addition, density measurement of the arsenic in the eluate obtained by the Environment Agency notification No. 13 elution test was performed by the assay approach that JIS K0102 corresponds.

[0037] 115g of pure water was added to 50.0g (0.394 mols) of example 1 [preparation of Drugs A] ferrous chloride anhydrides, and it considered as the water solution, and 2 and 2'-bipyridyl 6.15g (0.0394 mols) was added to this, and it considered as Drugs A. These drugs were red homogeneity solutions. It was the conditions of a room temperature under atmospheric air, and even after saving these drugs A for 90 days, they did not have precipitate, either and were red homogeneity solutions. What was saved for 90 days was used for processing of the ashes using these drugs A.

[0038] To the sludge combustion EP fly ash 100 weight section containing 62 ppm of [processing of arsenic content fly ash] arsenic, the water 25 weight section was added as humidification water, and the drugs solution was added and kneaded so that the ferrous chloride anhydride in the drugs A of the above-mentioned publication might serve as the 1.0 weight section. The Environment Agency notification No. 13 elution test was performed using the obtained processing fly ash, and the arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0039]

[Table 1]

N o .	灰の種類	鉄塩の種類	電子供与性有機化合物の種類	保存日数 (日)	鉄塩換算添加量 (重量部)	pH調整剤	pH調整剤系加量 (重量部)	溶出液のヒ素濃度 (ppm)
実施例 1	汚泥焼却飛灰	塩化第一鉄	2, 2'-ビピリジル	90	1. 0	-	-	0. 078
実施例 2	同上	同上	クエン酸	90	1. 0	-	-	0. 053
実施例 3	同上	同上	クエン酸第一鉄ナトリウム	0	1. 0	-	-	0. 061
実施例 4	同上	同上	同上	30	1. 0	-	-	0. 055
実施例 5	同上	同上	同上	90	1. 0	-	-	0. 049
実施例 6	同上	硫酸第一鉄	同上	90	2. 5	-	-	0. 096
比較例 1	同上	-	-	-	0. 0	-	-	1. 20
比較例 2	同上	塩化第一鉄	-	30	2. 5	-	-	0. 139
比較例 3	同上	塩化第一鉄	-	90	2. 5	-	-	0. 246
比較例 4	同上	塩化第二鉄	-	0	5. 0	-	-	0. 554
実施例 7	重油焼結灰	塩化第一鉄	クエン酸第一鉄ナトリウム	90	0. 5	C <sub>4</sub> (OH) <sub>2</sub>	1. 0	0. 134
実施例 8	同上	同上	同上	90	1. 0	C <sub>4</sub> (OH) <sub>2</sub>	1. 0	0. 077
実施例 9	同上	同上	同上	90	2. 5	C <sub>4</sub> (OH) <sub>2</sub>	1. 0	0. 014
比較例 5	同上	-	-	-	-	-	-	52. 6
比較例 6	同上	-	-	-	-	C <sub>4</sub> (OH) <sub>2</sub>	1. 0	0. 569
比較例 7	同上	塩化第二鉄	-	0	5. 0	C <sub>4</sub> (OH) <sub>2</sub>	1. 0	0. 327

表 1 において、- は用いなかったことを示す。

[0040] In example 2 example 1, except having replaced with the electron-

donative organic compound which shows 2 in Drugs A, and a 2'-bipyridyl in Table 1, drugs were prepared by the same mole ratio, arsenic content fly ash was processed, and the Environment Agency notification No. 13 elution test was performed. The arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0041] In three to example 5 example 1, it replaced with the electron-donative organic compound which shows 2 in Drugs A, and a 2'-bipyridyl in Table 1, and as a retention period of Drugs A, the example 3 prepared drugs by the same mole ratio, processed arsenic content fly ash, and performed the Environment Agency notification No. 13 elution test except having used immediately after preparation, having used the example 4 after preservation for 30 days, and having used the example 5 after preservation for 90 days. The arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0042] After saving the used drugs over a long period of time from these results, even if it performs processing of arsenic content fly ash, arsenic is fixed and it turns out that the engine performance formed into insoluble appearance is fully held.

[0043] In example 6 example 1, except having replaced with the ferrous chloride anhydride in Drugs A, and having used the ferrous-sulfate anhydride, drugs were prepared by the same mole ratio, arsenic content fly ash was processed, and the Environment Agency notification No. 13 elution test was performed. The arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0044] The Environment Agency notification No. 13 elution test was performed to the same sludge combustion EP fly ash as having used in example of comparison 1 example 1, without carrying out drugs processing, and the arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0045] 115g of pure water was added to 50.0g (0.394 mols) of example of comparison 2 [preparation of Drugs B] ferrous chloride anhydrides, it considered as the water solution, and this was made into Drugs B. When these drugs B were saved for 30 days on condition that the room temperature under atmospheric air,

brown precipitate deposited and it was uneven. Subsequently, these drugs were used for processing of the following fly ash.

[0046] To the same sludge combustion EP fly ash 100 weight section as having used in [processing of arsenic content fly ash] example 1, the solution of drugs was added and kneaded so that the ferrous chloride anhydride in Drugs B might serve as the 2.5 weight sections. The Environment Agency notification No. 13 elution test was performed using the obtained processing fly ash, and the concentration of the arsenic in the eluate which it is as a result was shown in Table 1.

[0047] The drugs B of the example 2 of example of comparison 3 comparison were saved for 90 days on condition that the room temperature under atmospheric air. Brown precipitate deposited and the solution was uneven. Using these drugs, like the example 2 of a comparison, the Environment Agency notification No. 13 elution test was performed, and the arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0048] Arsenic was fixed and the result of the examples 2 and 3 of a comparison showed that the engine performance formed into insoluble appearance was also falling, when arsenic content fly ash was processed, while the drugs used by these deteriorated by prolonged preservation.

[0049] In the example 2 of example of comparison 4 comparison, use 63.9g (0.394 mols) of ferric-chloride anhydrides instead of the ferrous chloride anhydride in Drugs B, prepare drugs, and it sets to fly ash processing. Except the anhydrous salt-ized second iron in drugs having considered as the 5.0 weight sections to the fly ash 100 weight section, arsenic content fly ash was processed similarly, the Environment Agency notification No. 13 elution test was performed, and the arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0050] 115g of pure water was added to 50.0g (0.394 mols) of example 7 [preparation of Drugs C] ferrous chloride anhydrides, and it considered as the water solution, and 10.6g (0.0394 mols) of sodium ferrous citrate was added to

this, and it considered as Drugs C. These drugs were the homogeneity solutions of a dark green color. Under atmospheric air, even after saving drugs for 90 days on condition that a room temperature, they did not have precipitate, either and were the homogeneity solutions of a dark green color. What was saved on the 90th was used for processing of the fly ash shown below.

[0051] To the fuel oil combustion fly ash 100 weight section containing 1080 ppm of [processing of arsenic content fly ash] arsenic, the calcium-hydroxide 10 weight section was added as the water 25 weight section and a pH modifier as humidification water, and the drugs solution was added and kneaded so that the ferrous chloride anhydride in Drugs C might serve as the 0.5 weight section further. The Environment Agency notification No. 13 elution test was performed using the obtained processing fly ash, and the arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0052] In an example 8 and nine examples 7, except having added so that it might become the addition to which the ferrous chloride anhydride in Drugs C shows drugs in Table 1, arsenic content fly ash was processed similarly, the Environment Agency notification No. 13 elution test was performed, and the arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0053] The Environment Agency notification No. 13 elution test was performed to the same arsenic content fuel oil combustion fly ash as having used in example of comparison 5 example 7, without carrying out drugs processing, and the arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0054] In example of comparison 6 example 7, except having not added drugs, the water as pH modifier and humidification water was added similarly, and kneading processing was performed. The Environment Agency notification No. 13 elution test was performed using the obtained processing fly ash, and the arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0055] 115g of pure water was added to the 63.9g (0.394 mols) of the example of comparison 7 [preparation of Drugs D] anhydrous salt-ized second iron, it considered as the water solution, and this was made into Drugs D.

[0056] To the fuel oil combustion fly ash 100 weight section containing [processing of arsenic content fly ash] arsenic, the water 25 weight section was added as humidification water, the calcium-hydroxide 10 weight section was added as a pH modifier, and drugs were added and kneaded so that the ferric chloride in Drugs D might serve as the 5.0 weight sections further. The Environment Agency notification No. 13 elution test was performed using the obtained processing fly ash, and the arsenic concentration in the eluate which it is as a result was shown in Table 1.

[0057] The concentration of the arsenic in the eluate in the class of the class of arsenic content ashes used for processing, the class of component contained in a processing agent and its amount, the preservation days of a processing agent, and pH regulator and its amount, and an elution test etc. was collectively shown in Table 1 about the above example, the example of a comparison, and the example of reference.

[0058] Since the arsenic content ashes processing agent containing a bivalence iron compound, an electron-donative organic compound, and water was fixed and carried out [insoluble appearance]-izing of the arsenic contained in ashes, while being able to stop the arsenic concentration in an eluate low from these results, even after carrying out fixed period preservation of the processing agent, it turned out that a fall is not accepted in the arsenic prehension capacity.

[0059]

[Effect of the Invention] The following effectiveness can be done so by this invention.

[0060] (1) The arsenic in arsenic content ashes is fixed simple efficiently, and-izing of it can be carried out [insoluble appearance].

[0061] (2) The mothball of a processing agent is possible, the work habits at liquefied or the time of using drugs, since it is a slurry-like can be performed simple, and established down stream processing can be used.

[0062] (3) Since the capacity of immobilization of arsenic and the formation of insoluble appearance is high, and it is thermally stable and pH adjustment is

possible, demonstrate effectiveness by little addition in the ashes of all the descriptions containing arsenic. For this reason, since it can carry out in insurance and a simple art even if it faces use of other assistants while it is economical, it is very useful industrially.

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[Translation done.]